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I, KIM MARSHALL, MANAGER PATENT OPERATIONS hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PP 5683 for a patent by BARTLEM PTY LTD filed on 03 September 1998.

WITNESS my hand this
Eleventh day of October 1999

KIM MARSHALL
MANAGER PATENT OPERATIONS



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"GARDEN SHREDDING APPARATUS"

This invention relates to garden shredding apparatus.

This invention has particular relevance to garden shredding apparatus for shredding leaves twigs and small branches.

Many brands of garden shredders are currently available and commonly include an inlet hopper which can be loaded with leaves and twigs for shredding as well as a small bore inlet chute for introducing small stems and branches to be shredded. Mostly these machines utilise a flail assembly at the base of the hopper for shredding the leaves and twigs therein and a separate chipper assembly at the base of the small bore inlet chute for shredding small stems and branches introduced therethrough.

Disadvantages associated with these types of shredders stems from their relative complexity making servicing, such as drive belt and blade sharpening operations difficult and unreliability where rotary chipping plates are fixed directly to the engine shaft for the purposes of simplicity.

Furthermore the flail assembly is often readily accessible from the underside of the machine making them dangerous for operation around children. In addition the flail assembly shreds green leafy material to a very fine form which may not be the most suitable for garden mulching operations.

The present invention aims to alleviate one or more of the above disadvantages and/or to provide garden shredding

apparatus which will be reliable and efficient in use.

With the foregoing in view, this invention in one aspect resides broadly in garden shredding apparatus including:-

a rotary chipper head assembly supported for rotation in a chamber and having a disc rotor which carries one or more chipper blades adjacent an outer periphery thereof and which trail respective apertures which extend through the rotor and through which chipped material may pass to the underside of the rotor;

10 a hopper supported above the chipper head assembly and communicating through a hopper port in the base frame and disposed in the path of the chipper blade or blades;

15 a small bore inlet chute communicating through a small port in the base frame and disposed in the path of the chipper blade or blades, and

drive means for rotating the rotor.

Preferably the garden shredding apparatus is also provided with air flow inducing means for inducing flow through the hopper and the inlet chute into the chamber housing the rotor so as to assist in induction of material in the hopper or inlet chute into the chamber in the path of the chipper blade or blades. This may be in the form of an exhaust fan associated with the outlet from the chamber but preferably it is a fan mounted on or associated with the 25 rotor.

In a preferred form the inlet ports associated with the

hopper and inlet chute are disposed at a common side of the rotor in an end wall of the chamber which is disposed close to the chipper blades. It is further preferred that the fan for inducing flow through the hopper is mounted on the rotor 5 at the side thereof remote from the inlet ports. The fan may be a separate component or it may be blades or vaned mounted to the rotor face. The rotor may be supported for rotation about a horizontal axis, a vertical axis, or an inclined axis.

10 It is preferred that the rotor be mounted for direct drive on the output shaft of the drive motor which may be an electric motor or an internal combustion engine. In the case of an internal combustion engine it is preferred that the rotor be fixed to a hub which extends about the output shaft 15 and which is supported by a bearing mounted and that both the motor and the bearing for the hub be mounted to the end wall in which the inlet ports are formed. In this manner the outer normally free end of the output shaft is supported by the hub bearing against loads imposed by the rotor.

20 Preferably the hub bearing is a self-aligning bearing of the type which may be locked to the hub, such as a self-aligning cam-lock sealed ball bearing, which is locked to the hub after adjusting end play of the engine shaft so as to reduce end loads being transferred to the crank shaft of the 25 engine. For this purpose it is preferred that the engine is supported on a bracket above the hub bearing in such manner

that access may be gained to the hub bearing for locking purposes after securing of the rotor to the output shaft. This arrangement provides a very simple and cost effective means of achieving reliable operation with direct drive from
5 an internal combustion engine.

It is desirable that the rotor be provided with means to prevent string material from becoming entangled about the hub of the rotor. In one form this includes the provision of macerator blocks or blades mounted on the rotor and co-acting
10 with complementary fixed blocks or blades mounted on the end wall of the rotor housing.

In a particular embodiment of the invention the rotor is supported from the nominally horizontal upper end wall of a nominally horizontal rotor housing and the housing has upper
15 and lower parts which are hingedly connected to one another whereby the upper part which carries the rotor, the motor and the hopper and chute may hinge away from the lower part to expose the rotor. In this form the lower housing part is suitably supported on skids or wheels.

20 This configuration of the rotor housing also constitutes another aspect of this invention and may be utilised to advantage without being limited to utilising the particular shredding apparatus described above.

It is also preferred that in this form the upper housing
25 part be provided with suspension means for suspending a catcher across an outlet aperture in the side wall of the

housing. Suitably the catcher is mounted remote from the hinging mechanism.

Similarly the configuration of the motor and rotor mounting utilising a separate bearing to isolate the rotor loads from the direct mounted motor shaft constitutes a further aspect of this invention and may be utilised to advantage without being limited to utilising the particular shredding apparatus or housing described above.

In order that this invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings which illustrate a typical embodiment of the invention and wherein:-

Fig. 1 is a side view of the shredding apparatus fitted with a catcher;

Fig. 2 is corresponding view but shown without a catcher;

Fig. 3 illustrates the shredding apparatus disposed in a servicing mode;

Fig. 4 is a part-sectional view of the rotor and its mounting;

Fig. 5 is a cutaway plan view of the rotor assembly, and FIGS. 6 and 7 illustrates in plan and side sectional views a further embodiment of the rotor assembly.

The garden shredding apparatus 10 illustrated in the drawings has a two-part housing 11 supported on rear wheels 12 and a front stand 13, a hopper assembly 14 and a small bore inlet chute 15 extending upwardly from the upper housing part 16 and a catcher 17 suspended from the front of the housing 11.

The housing 11 contains a rotary chipper assembly 20, illustrated in Fig. 4, and supports a small petrol motor 21 thereabove for driving the rotary chipper assembly 20.

Opposed pin hinges 22 attach the upper housing part 16 to the lower housing part 19 at the rear thereof which enable the upper housing part 16 and the components mounted thereon to fold to an open position, as illustrated in Fig. 3, at which the handle 24 rests on the ground and clear access is provided to the rotary chipper assembly 20 through the open underside of the top housing part 16. The front of the top housing part 16 is retained on the lower housing part 19 by bolts 25.

As illustrated in Figs. 4 and 5, the rotary chipper assembly 20 has a disc-like rotor 28 formed with opposed radially extending slots 27 at diametrically opposite positions and a chipper blade 30 bolted to the rotor 28 adjacent the trailing side of each slot 27.

Macerator blocks 29 are interposed between the blades 30 and are fixed to the rotor 28 with inner ends spaced from the hub 31 to which the rotor 28 is bolted. A pin 32 extends

down from the end wall 33 of the upper housing part 16 toward the rotor 28 and is position between the hub 31 and the macerator blocks 29.

The hub 31 is formed at the lower end of a thick-walled sleeve 35 which is bored to accept the output shaft 36 of the motor 21 which is keyed thereto by a key in conventional manner. The lower end of the motor shaft 36 is threaded to receive a retaining bolt 37 which pulls the rotor 28 against the end of the shaft 36. The rotor is also bolted to the hub 31 by bolts 38.

The sleeve 35 is supported by a large capacity self-aligning cam-lock bearing 40 which is secured to the end wall 33 through a stiffening boss 41. This bearing is locked to the motor shaft 36 so as to support the weight of and end thrust placed upon the rotor 28.

The bearing 40 also accommodates the side and impact loads imparted by the operation of the chipper blades 30. This isolates undesirable loads being applied to the crankshaft of the directly mounted motor 21 which is supported on a channel shaped mounting 23 fixed to the end wall 33. For this purpose the rotor 28 is relatively heavy so as to act as a flywheel. In this embodiment the rotor 28 is 5mm thick steel plate.

The underside of the rotor 28 has impeller blades 44 bolted thereto so as to create an air flow through the open front 45 of the housing 11. This induces a downdraught

through the hopper assembly 14 and the small bore inlet chute 15 which assists in feeding material to be mulched therethrough toward the rotor 28.

The induced draught also throws shredded material
5 through the outlet which is normally closed by a flap 47
hinged along its upper edge and pivotable upwardly to permit
a conventional grass catcher 50 to be removably clipped to
the housing 11 to receive the shredded material. Typically
the grass catcher 17 is interchangeable with the grass
10 catcher from a domestic rotary mower.

It will be seen that the hopper assembly 14 has a
forwardly convergent transition piece 51 extending from its
underside to the inlet aperture formed in the top wall 33,
while the inlet chute 15 is angled back to assist feeding of
15 the material being fed therethrough toward the rotor 28.

In use when the rotor 28 is rotated at high speed, air
is induced to flow through the hopper 14 and inlet chute 15,
which may be capped if desired. This air flow assists in the
feeding of material to be shredded to the rotor 28. Most of
20 this matter will be shredded by the chipper blades 30 and
pass through the apertures 27 for discharge to the catcher.

Should leafy material or stringy material move across
the top of the rotor 28 toward the hub 31 it will be
contacted by the macerator blocks 29 and be pulverised.
25 These blocks cooperate with the pin 32 to prevent long
lengths of material reaching the hub 31 and becoming entwined

theraround.

In the event that the chipper blades need servicing, they can be access easily by releasing the bolts 25 and pivoting the top housing part to its open position as illustrated in Fig. 3. In this position the rotor 28 is stably supported for safe working conditions. An inlet safety flap 48 is pivotally attached to the upper end of the hopper to close the hopper after the addition of material to be shredded.

This arrangement provides a shredder of very simple form which has the bulk of its weight centralised between the wheels 12 and the stand 13 for stable operation. The weight of the hopper is offset by the catcher and the handle 24 provides for simple balanced wheeling of the shredder 10 from location to location and support for the opened housing.

The rotary chipper assembly 55 illustrated in Figs. 6 and 7 has opposed blades 56 formed with upturned cutting ends 57 at their inner ends, the blades 56 being bolted to the rotor 58. A complementary arcuate blade 59 centered on the rotor axis is fixed to the end wall 60 of the upper housing part and is located close to the upturned ends 57 as they rotate thereby to cut up long strands of matter which may be fed toward the boss 62. This prevents such long strands from winding about the boss and possibly entering the bearing seal of its supporting bearing.

It will of course be understood that the above has been

given by way of illustrative example of the present invention
and that all such modifications and variations thereto as
would be apparent to persons skilled in the art are deemed to
fall within the broad scope and ambit of the invention as is
5 herein set forth.

DATED THIS Third DAY OF September 1998.

BARTLEM PTY LTD

BY

PIZZEYS PATENT & TRADE MARK ATTORNEYS

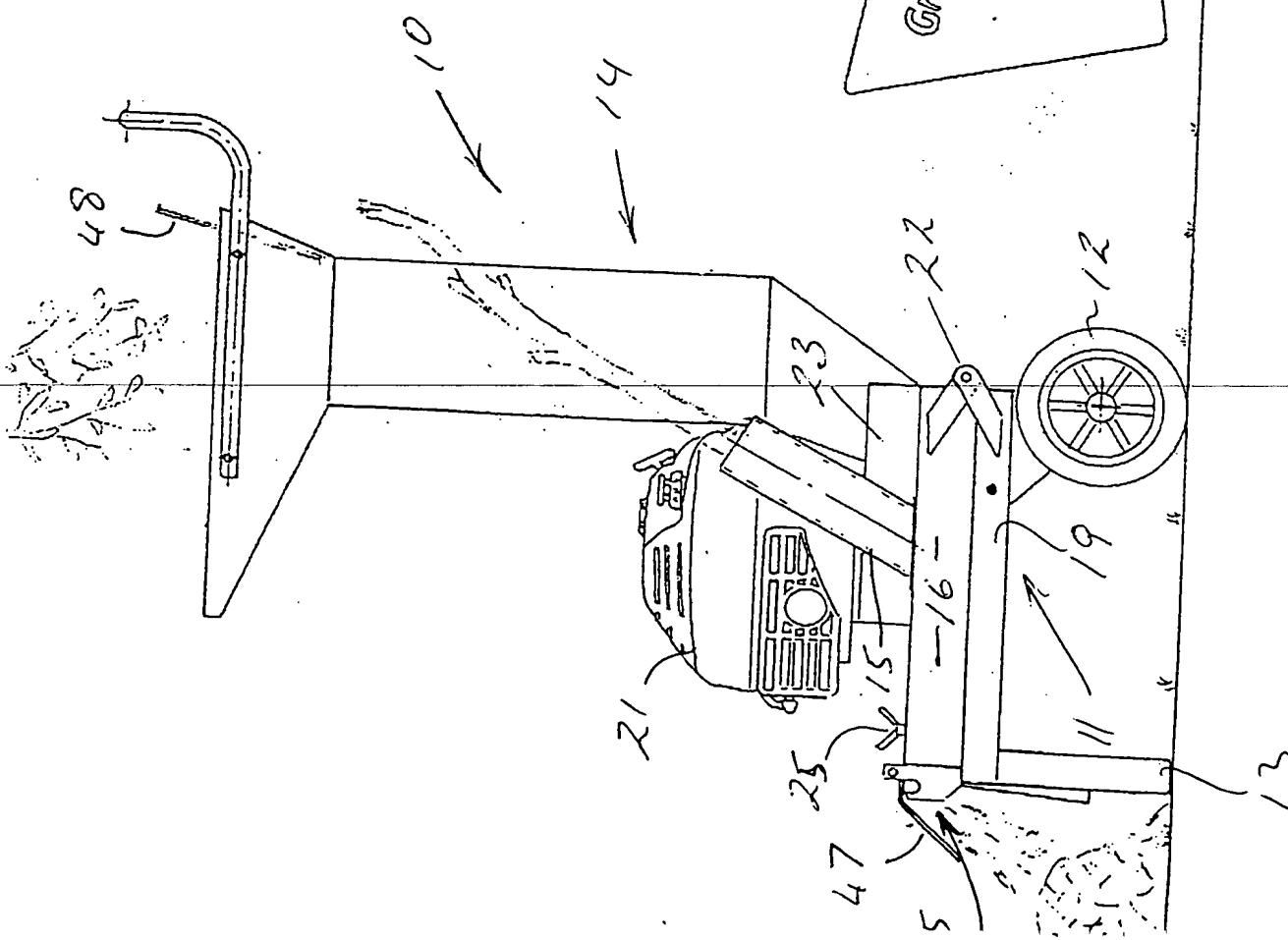


Fig. 2.



Fig. 1.

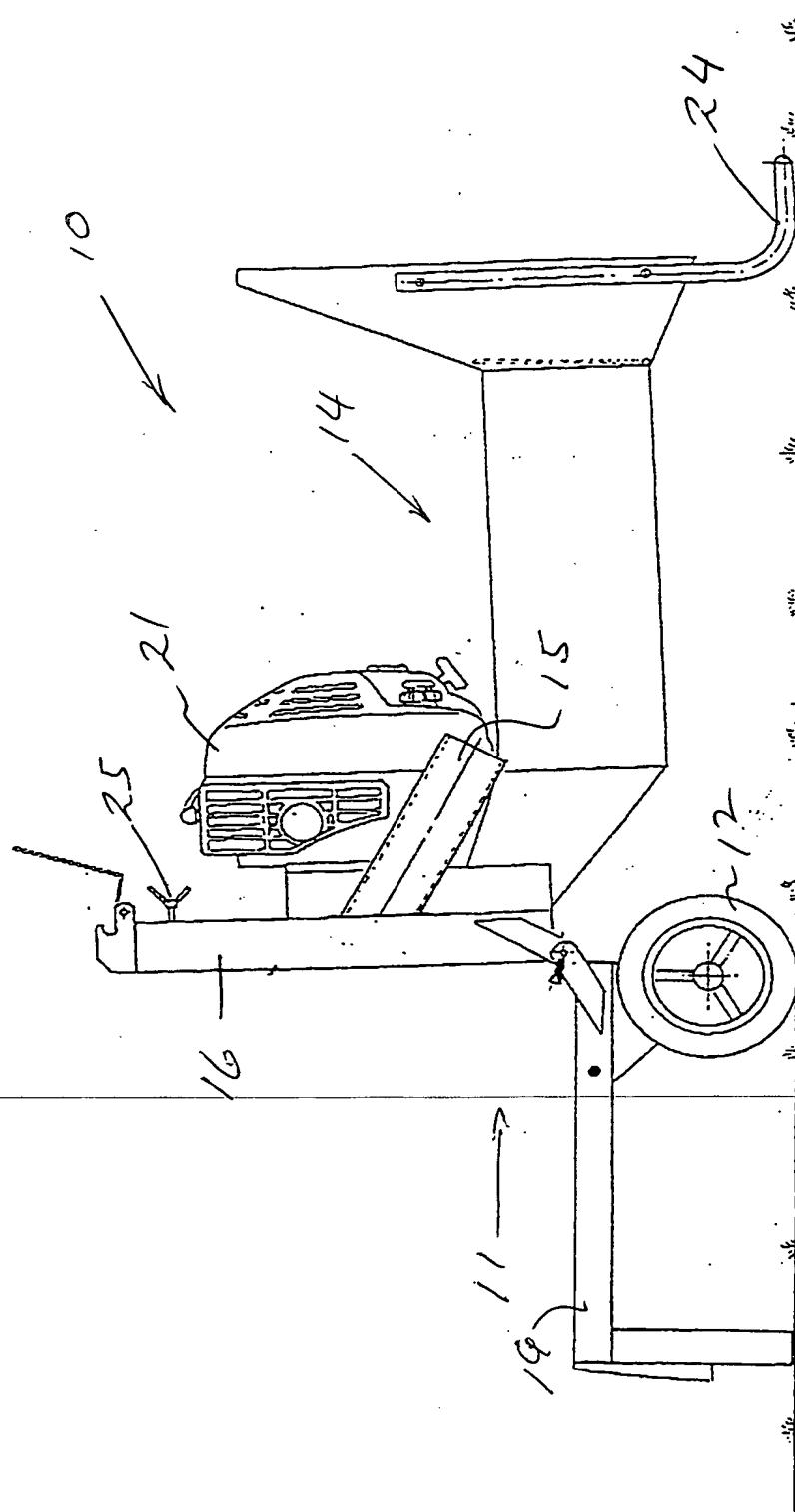


Fig. 3.

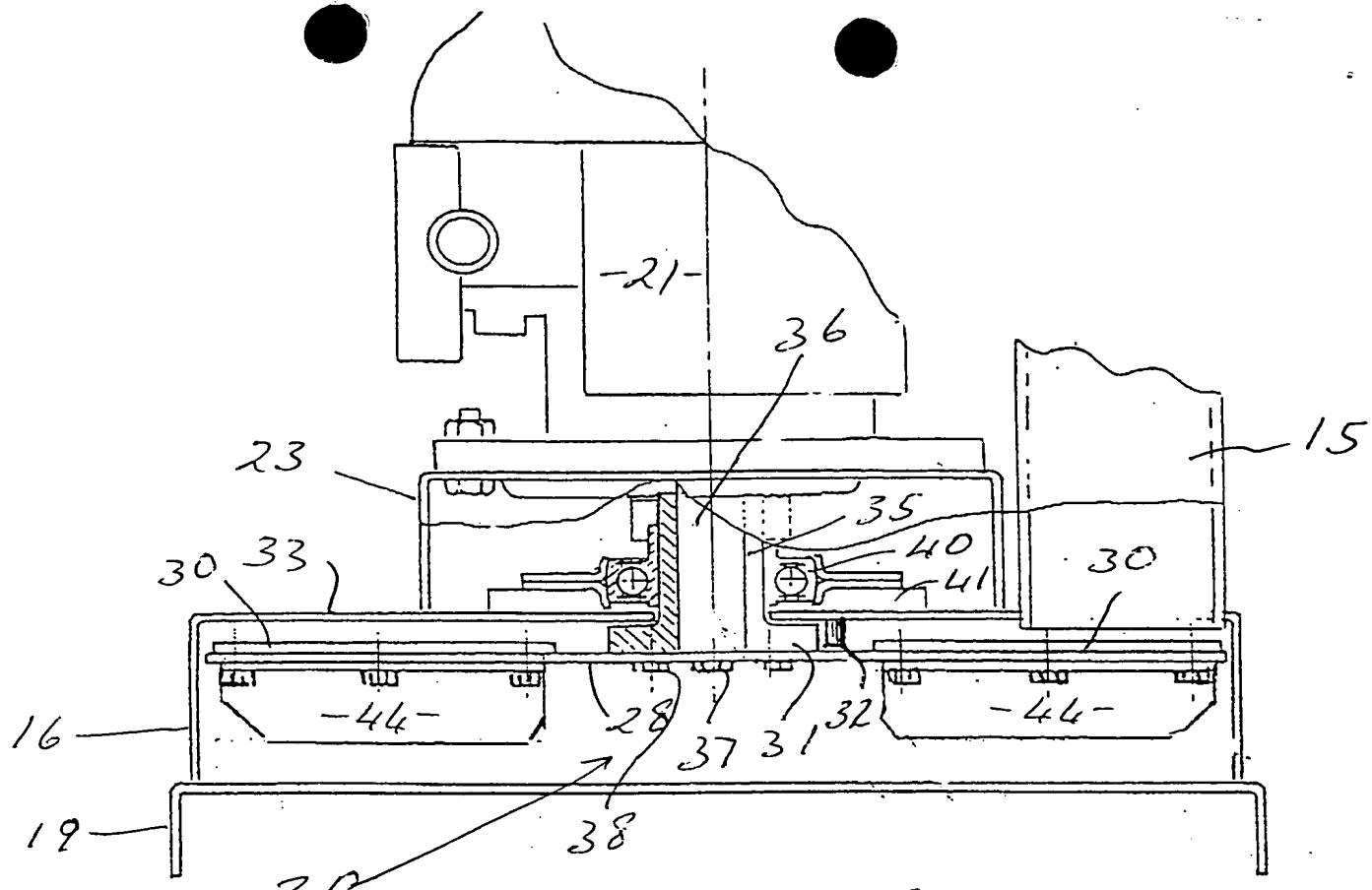


Fig. 4.

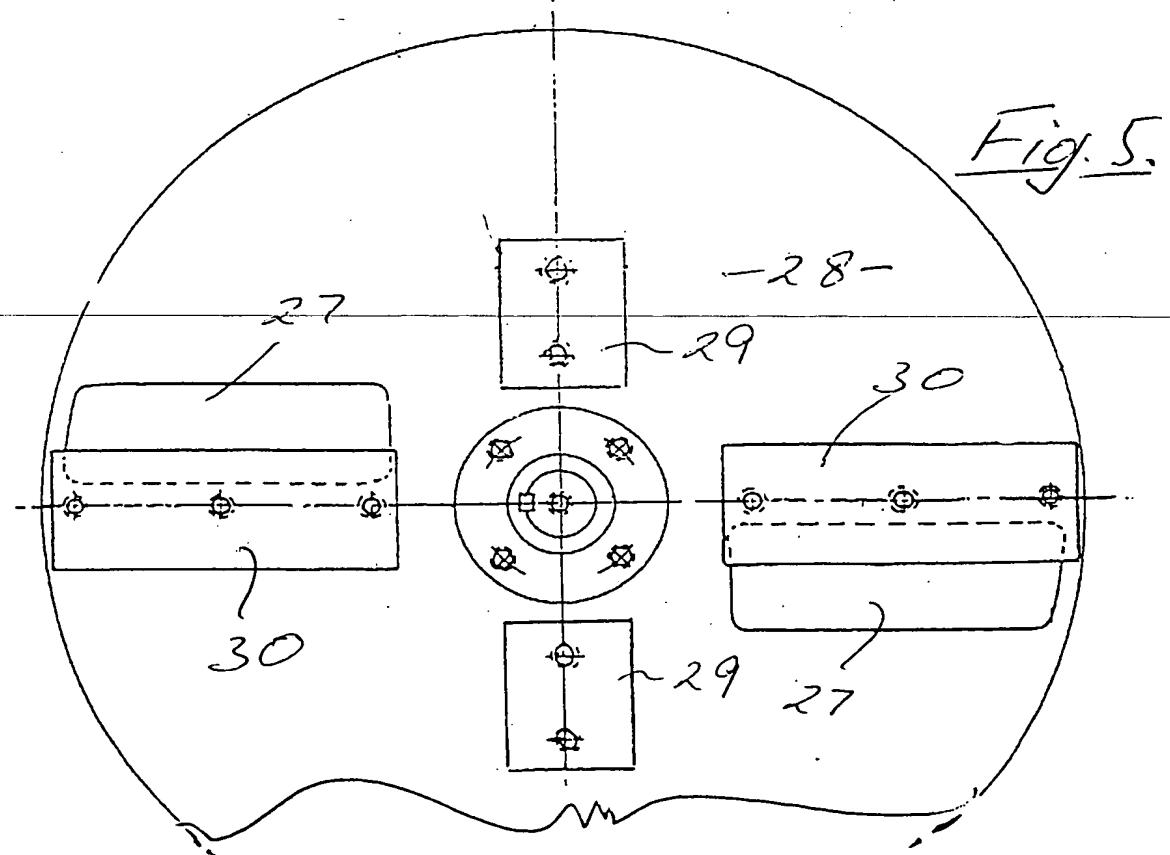


Fig. 5.

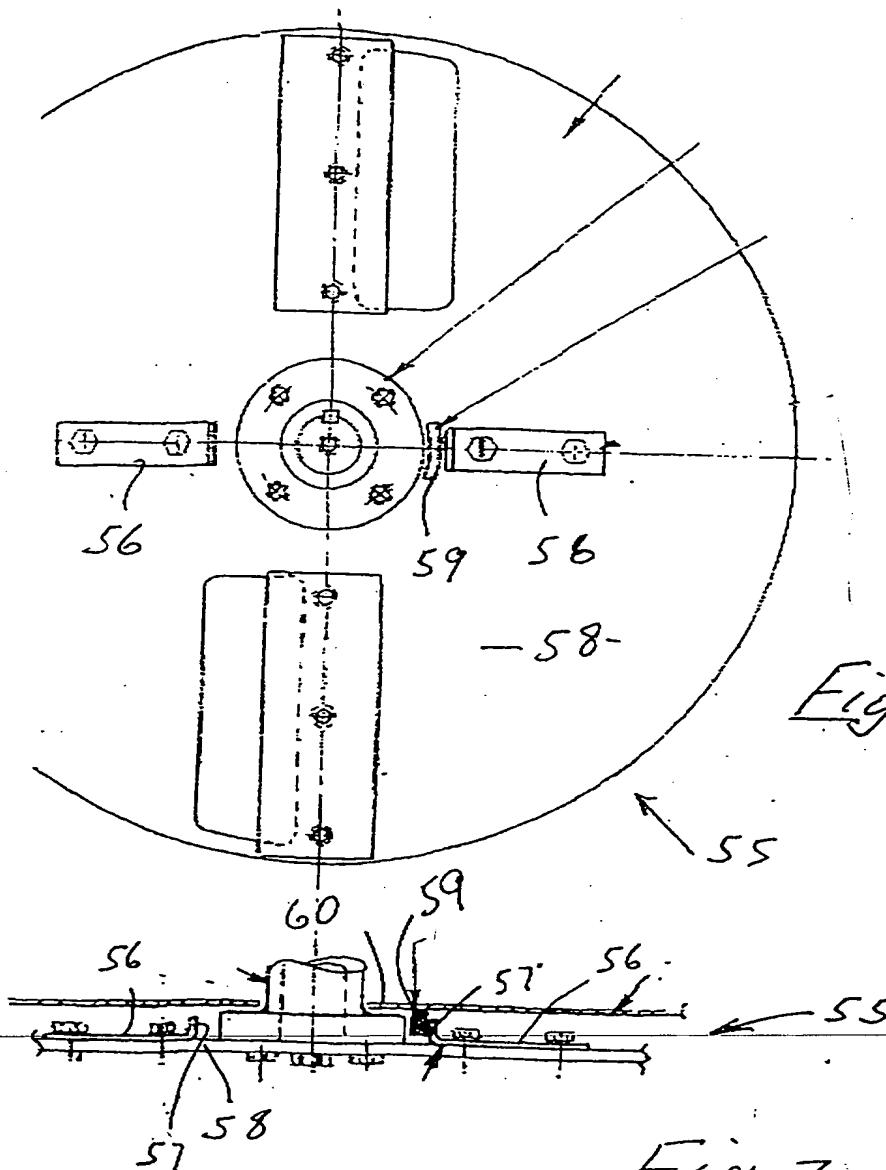


Fig. 6

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